WHAT IS CLAIMED IS:

1.   A method of processing communication signals, comprising steps of:

    (a)   receiving a transmitted encoded media data stream comprising a plurality of data elements, each data element representing a portion of a transmitted media session;

    (b)   if a data element arrives prior to, or at, a predetermined playout deadline, performing steps of:

        (b)(i)   decoding the data element;

        (b)(ii)   playing the media represented by the decoded data element; and

        (b)(iii) providing the data element to a decoder state machine to update a decoder state; and

    (c)   if a data element arrives after the predetermined playout deadline, providing the data element to the decoder state machine to update the decoder state.

2.   The method of claim 1 wherein if a data element arrives after the predetermined playout deadline, pursuant to step (c), the data element is not decoded and the media represented by the decoded data element is not played.

3.   The method of claim 1 wherein the media data stream is an encoded audio data stream comprising a plurality of audio data elements, each representing a portion of a transmitted audio session.

4.   The method of claim 3 wherein the media data stream is an encoded voice data stream comprising a plurality of voice data elements, each representing a portion of a transmitted voice session.

5.   The method of claim 1 wherein the media data stream is an encoded video data stream comprising a plurality of video data elements, each representing a portion of a transmitted video session.

6.   The method of claim 1 wherein the playout deadline comprises an end of a predetermined interval that starts at an expected arrival time of the data element.

7.   The method of claim 1 wherein the playout deadline comprises an end of a predetermined interval that starts when a previous data element in the data stream is received.

8.   The method of claim 1 wherein decoding step (b)(i) comprises releasing the data element to a decoder that decodes the data element and wherein the playout deadline comprises an end of a predetermined interval that starts when a previous data element in the data stream is released to the decoder.

9.   The method of claim 1 wherein the playout deadline comprises an end of a predetermined interval that starts when a first data element in the data stream is received.

10.   The method of claim 1 wherein the data elements are packets of encoded data.

11.   The method of claim 1 wherein the data elements are frames of encoded data.

12.   The method of claim 1 wherein the decoder state machine is used to estimate characteristics of unreceived data elements based on characteristics of already-received data elements.

13.   The method of claim 1 wherein the decoder state machine is used to assist in determining characteristics of received data elements based on characteristics of previously-received data elements.

14.   The method of claim 1 further comprising a step (d) of:

    (d)   if a data element has not arrived by the playout deadline, performing steps of:

        (d)(i)   estimating the characteristics of the non-arriving data element;

        (d)(ii) playing the media represented by the estimated non-arriving data element;

and

(d)(iii) providing the estimated non-arriving data element to a decoder state machine to update a decoder state.

15. The method of claim 14 wherein estimating step (d)(i) comprises estimating the characteristics of the non-arriving data element based upon characteristics of already-received data elements.

16. The method of claim 14 wherein step (c) comprises: if a data element whose characteristics have been estimated pursuant to step (d) arrives after the predetermined playout deadline, providing the data element to the decoder state machine to update the decoder state.

17. The method of claim 1 wherein the data elements are cells of encoded data.

18. A method of processing communication signals, comprising steps of:

(a) receiving a transmitted encoded media data stream comprising a plurality of data elements, each data element representing a portion of a transmitted media session;

(b) if a specified data element arrives prior to, or at, a predetermined playout deadline, performing steps of:

(b)(i) decoding the data element;

(b)(ii) playing the media represented by the decoded data element; and

(b)(iii) providing the data element to a decoder state machine to update a decoder state; and

(c) if the specified data element fails to arrive prior to, or at, the playout deadline, performing steps of:

(c)(i) saving a subsequently received data element in memory;

(c)(ii) if the specified data element arrives after the predetermined playout deadline, providing the specified data element and the saved, subsequently received, data element to the decoder state machine to update the decoder state.

19. The method of claim 18 wherein saving step (c)(i) comprises saving a plurality of subsequently received data elements in memory and wherein step (c)(ii) comprises: if the

specified data element arrives after the predetermined playout deadline, providing the specified data element and the saved, subsequently received, data elements to the decoder state machine to update the decoder state.

20.   The method of claim 19 wherein saving step (c)(i) comprises saving all data elements that are received subsequent to the playout deadline but before the arrival of the specified data element and wherein step (c)(ii) comprises: if the specified data element arrives after the predetermined playout deadline, providing the specified data element and the saved, subsequently received, data elements to the decoder state machine to update the decoder state.

21.   The method of claim 18 wherein if the specified data element arrives after the predetermined playout deadline, pursuant to step (c)(ii), the specified data element is not decoded and the media represented by the decoded data element is not played.

22.   The method of claim 18 wherein the media data stream is an encoded audio data stream comprising a plurality of audio data elements, each representing a portion of a transmitted audio session.

23.   The method of claim 22 wherein the media data stream is an encoded voice data stream comprising a plurality of voice data elements, each representing a portion of a transmitted voice session.

24.   The method of claim 18 wherein the media data stream is an encoded video data stream comprising a plurality of video data elements, each representing a portion of a transmitted video session.

25.   The method of claim 18 wherein the playout deadline comprises an end of a predetermined interval that starts at an expected arrival time of the specified data element.

26.   The method of claim 18 wherein the playout deadline comprises an end of a predetermined interval that starts when a previous data element in the data stream is received.

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27.   The method of claim 18 wherein decoding step (b)(i) comprises releasing the data element to a decoder that decodes the data element and wherein the playout deadline comprises an end of a predetermined interval that starts when a previous data element in the data stream is released to the decoder.

28.   The method of claim 18 wherein the playout deadline comprises an end of a predetermined interval that starts when a first data element in the data stream is received.

29.   The method of claim 18 wherein the data elements are packets of encoded data.

30.   The method of claim 18 wherein the data elements are frames of encoded data.

31.   The method of claim 18 wherein the decoder state machine is used to estimate characteristics of lost data elements based on characteristics of already-received data elements.

32.   The method of claim 18 wherein the decoder state machine is used to assist in determining characteristics of received data elements based on characteristics of previously-received data elements.

33.   The method of claim 18 wherein step (c) further comprises steps, to be performed prior to step (c)(i), of:

        (c)(iii) estimating the characteristics of the specified data element;

        (c)(iv) playing the media represented by the estimate of the specified data element; and

        (c)(v) providing the estimate of the specified data element to a decoder state machine to update a decoder state.

34.   The method of claim 33 wherein estimating step (c)(iii) comprises estimating the characteristics of the specified data element based upon characteristics of already-received data elements.

35.   A communication system for processing a transmitted encoded media data stream comprising a plurality of data elements, each data element representing a portion of a transmitted media session, the communication system comprising:

a jitter buffer adapted to receive the data stream and to store each data element until a playout deadline for the data element is reached, at which time the data element is provided to a decoder and to a decoder state machine, wherein if the jitter buffer receives a late data element after the playout deadline, the late data element is provided to the decoder state machine;

a decoder adapted to decode media data elements provided by the jitter buffer;

a decoder state machine adapted to maintain and update a decoder state based on data elements provided by the jitter buffer; and

an output element adapted to receive decoded data elements from the decoder and to play the media represented by the decoded data elements.

36.   The communication system of claim 35 wherein if the jitter buffer receives a data element after the playout deadline, the data element is not decoded and the media represented by the decoded data element is not played.

37.   The communication system of claim 35 wherein the media data stream is an encoded audio data stream comprising a plurality of audio data elements, each representing a portion of a transmitted audio session.

38.   The communication system of claim 35 wherein the media data stream is an encoded voice data stream comprising a plurality of voice data elements, each representing a portion of a transmitted voice session.

39.   The communication system of claim 35 wherein the media data stream is an encoded video data stream comprising a plurality of video data elements, each representing a portion of a transmitted video session.

40.   The communication system of claim 35 wherein the playout deadline for each data element comprises an end of a predetermined interval that starts at an expected arrival time of the data element.

41.   The communication system of claim 35 wherein the playout deadline for each data element comprises an end of a predetermined interval that starts when a previous data element in the data stream is received by the jitter buffer.

42.   The communication system of claim 35 wherein the playout deadline for each data element comprises an end of a predetermined interval that starts when the jitter buffer provides the previous data element in the data stream to the decoder.

43.   The communication system of claim 35 wherein the playout deadline for each data element comprises an end of a predetermined interval that starts when the jitter buffer receives a first data element in the data stream.

44.   The communication system of claim 35 wherein the data elements are packets of encoded data.

45.   The communication system of claim 35 wherein the data elements are frames of encoded data.

46.   The communication system of claim 35 wherein the decoder state machine is adapted to estimate characteristics of unreceived data elements based on characteristics of already-received data elements provided by the jitter buffer.

47.   The communication system of claim 35 wherein the decoder state machine is adapted to assist in determining characteristics of data elements received by the decoder based on characteristics of previously-received data elements provided by the jitter buffer.

48.   The communication system of claim 35 further comprising a lost-data-element recovery engine, wherein if a given data element is not received by the jitter buffer by the playout deadline, the lost-data-element recovery engine estimates the characteristics of the unreceived data element and provides the estimated data element to the output element and to the decoder state machine to update the decoder state.

49.   The communication system of claim 48 wherein the lost-data-element recovery engine estimates the characteristics of the unreceived data element based upon characteristics of data elements previously received by the jitter buffer.

50.   The communication system of claim 48 wherein if a late data element is received by the jitter buffer after the playout deadline and after the lost-data-element recovery engine has estimated the data element, the jitter buffer provides the late data element to the decoder state machine to update the decoder state.